

# **LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES**



## **OFFICE OF FISHERIES INLAND FISHERIES SECTION**

### **PART VI -B**

## **WATERBODY MANAGEMENT PLAN SERIES**

## **BUNDICK LAKE**

### **WATERBODY EVALUATION & RECOMMENDATIONS**

## **CHRONOLOGY**

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# **WATERBODY EVALUATION**

## **STRATEGY STATEMENT**

### Recreational

Black basses, crappies and catfishes in Bundick Lake are managed to provide anglers the greatest opportunity to catch and harvest a limit of fish. Sunfishes are managed to provide a sustainable population while providing anglers the opportunity to catch and harvest fish.

### Commercial

The physical characteristics of Bundick Lake do not support the large fish species that normally comprise a commercial fishery. The commercial fishery is limited to catfish species including channel catfish (*Ictalurus punctatus*), blue catfish (*I. furcatus*), flathead catfish (*Pylodictis olivaris*), and the bullhead catfishes (*Ameiurus spp.*). Catfish are managed to provide a sustainable population while providing anglers and commercial fishers the opportunity to harvest numbers of fish.

### Species of Special Concern

No threatened or endangered fish species are found in this waterbody.

## **EXISTING HARVEST REGULATIONS**

### Recreational

Statewide regulations for all fish species, the 2015 recreational fishing regulations may be viewed at the link below:

<http://www.wlf.louisiana.gov/fishing/regulations>

Trot lines, yo-yos, and set hooks are legal gear.

### Commercial

The 2015 commercial fishing regulations may be viewed at the link below:

<http://www.wlf.louisiana.gov/fishing/regulations>

Trotlines and slat traps are the only legal commercial gears allowed for use in Bundick Lake. The use of gill nets, trammel nets, fish seines and hoop nets are prohibited as per RS 76:119.

## SPECIES EVALUATION

### Recreational

#### Black Bass

##### *Largemouth bass*

Electrofishing is the most commonly used sampling technique to assess largemouth bass relative abundance (catch per unit effort = CPUE), size distribution and relative weight (physical body condition). Data collected during spring and fall electrofishing are used to describe population trends, age composition, growth rate, mortality rate and the genetic composition of a LMB population.

##### Relative abundance, size distribution and relative weight-

Largemouth bass harvest is regulated with statewide length and creel limits (see above). Largemouth bass (LMB) make up over 90% of the population of black bass in Bundick Lake. Size distribution of the LMB population (length frequencies) generated from standardized sampling results show a normally distributed population structure (Figure 1), with 57% of the largemouth bass ranging between 8 and 15 inches in total length (TL).

Mean relative weight (Wr) for each inch group is also shown in Figure 1. This measurement is obtained from fall samples only and is defined as the ratio of fish weight to the weight of a “standard” fish of the same length. The Wr index is calculated by dividing the weight of a fish by the standard weight for its length, and multiplying the quotient by 100. Largemouth bass relative weights below 80 may indicate a problem of insufficient or unavailable forage; whereas relative weights closer to 100 indicate sufficient forage is available. A description of the forage species and sampling methods is described below. Mean relative weights for almost all size classes of largemouth bass from Bundick Lake are at or above the 95 value, indicating a healthy population with adequate forage.

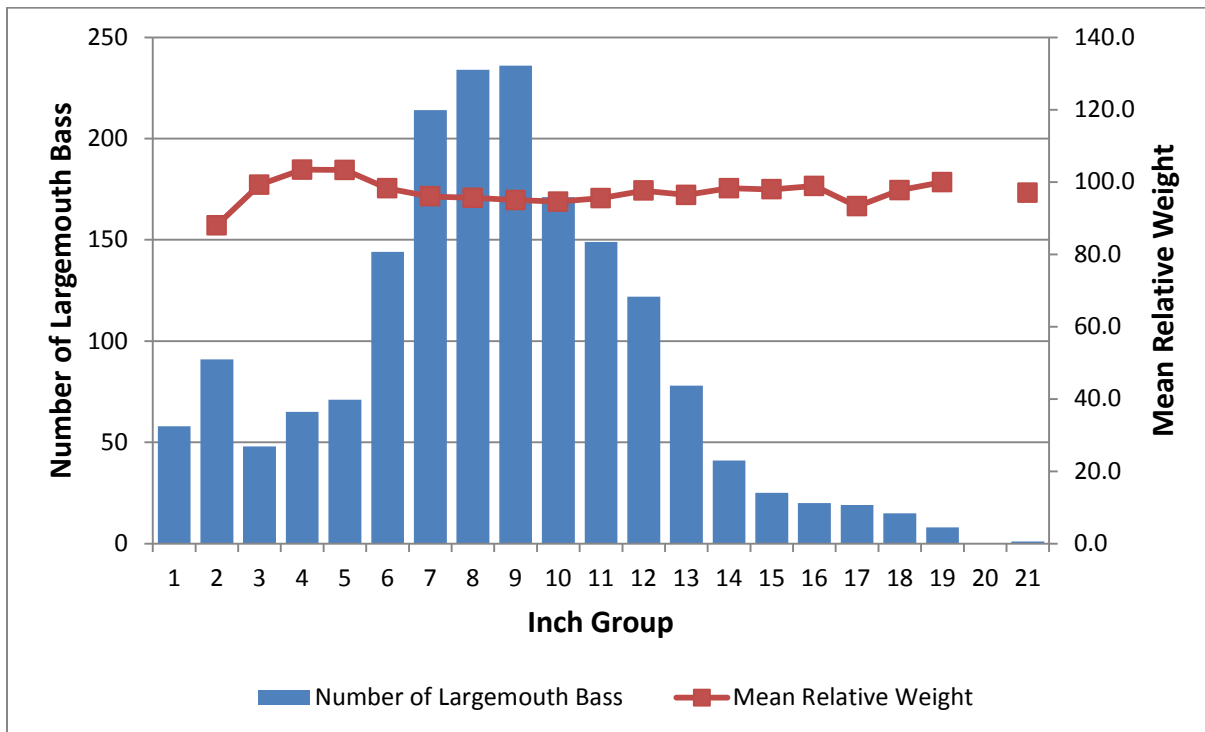


Figure 1. Largemouth bass size distribution (length groups) of fish collected from all gear types for all seasons, 2000 - 2014 (n=1,810). Mean relative weights by inch group for LMB collected during fall electrofishing from 2000-2014 (n=823).

Standardized electrofishing results indicate high variability in CPUE in the fall, with mean CPUE usually ranging from 40 to 150 bass/hour. This variability most likely indicated variable annual recruitment (Figure 2). Spring catch rates are more stable, with CPUE usually ranging from 40 to 80 bass/hour (Figure 3). The CPUE of quality size (>12") fish is similar between spring and fall, with means of 15.4 and 14.8, respectively. This, along with normal relative weight factors, indicates a stable, harvestable population of largemouth bass in Bundick Lake.

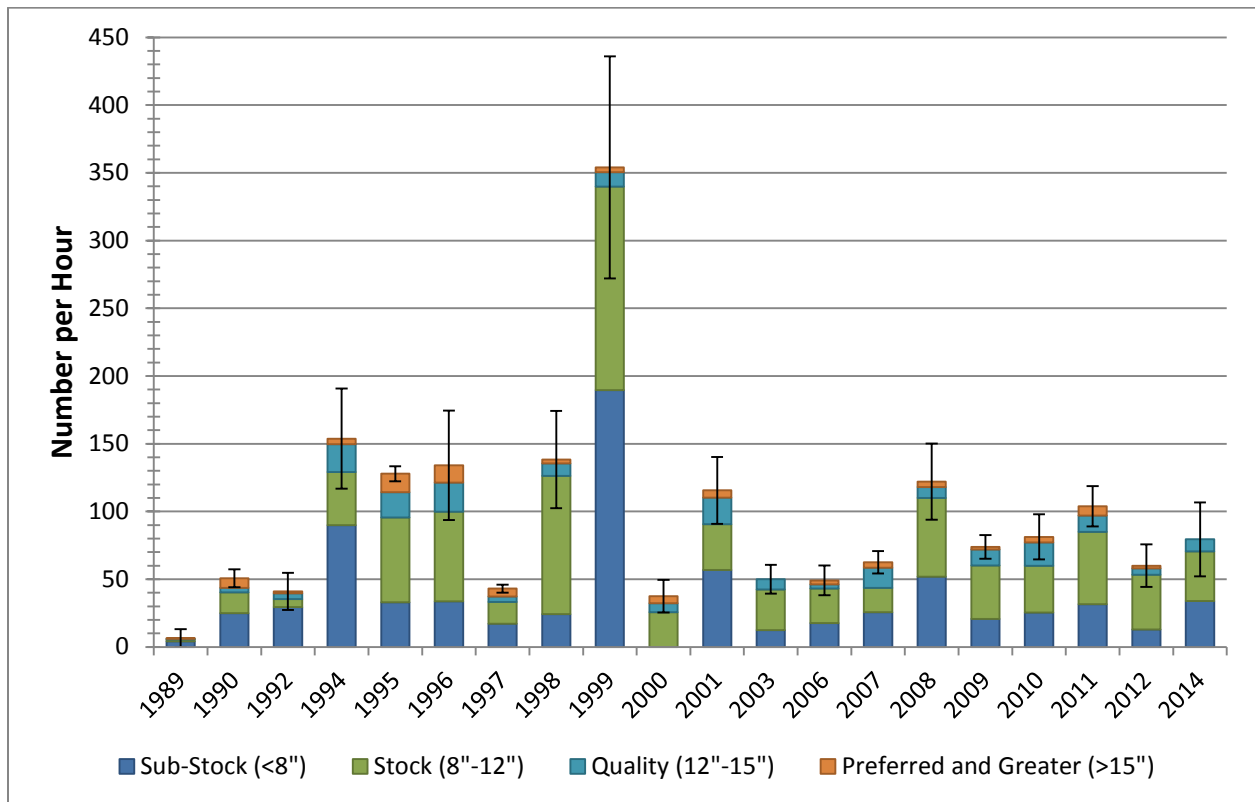


Figure 2. Mean CPUE ( $\pm$  SE) of largemouth bass by size class collected during standardized fall electrofishing from 1989-2014.

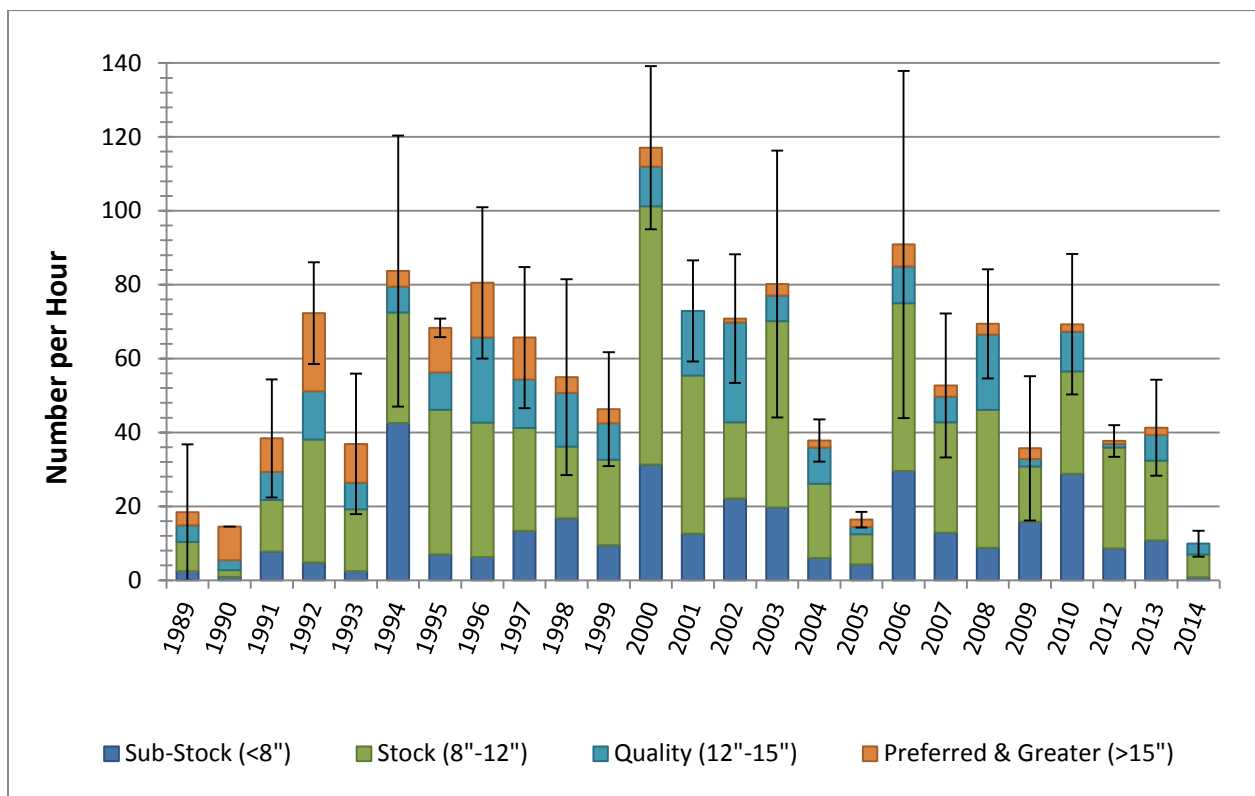


Figure 3. Mean CPUE ( $\pm$  SE) of largemouth bass by size class collected during standardized spring electrofishing from 1989-2014.

### Size structure indices

Proportional stock density (PSD) and relative stock density (RSD) are indices used to numerically describe length-frequency data (Anderson and Neumann 1996). Proportional stock density compares the number of fish of quality size (greater than 12 inches for largemouth bass) to the number of bass of stock size (greater than 8 inches in length), and is calculated by the formula:

$$\text{PSD} = \frac{\text{Number of bass} \geq 12 \text{ inches}}{\text{Number of bass} \geq 8 \text{ inches}} \times 100$$

PSD is expressed as a percentage. A fish population with a high PSD consists mainly of larger individuals, whereas a population with a low PSD consists mainly of smaller fish. A value between 40 and 70 generally indicates a balanced bass population. In Bundick Lake, spring PSD values do not show a great degree of variability, with the exception of 2000-2003 and 2012 (Figure 4). Fall PSD values show a much greater degree of variability, which is attributable to variable recruitment (Figures 5 and 7). In 2014, spring and fall PSD values were 20 and 33, respectively (Figures 4 and 5). These values suggest that the LMB population may be slightly out of balance with an overabundance of smaller fish.

Relative stock density (preferred,  $\text{RSD}_{15}$ ) is the percentage of largemouth bass in a stock (fish over 8 inches) that are 15 inches TL or longer, and is calculated by the formula:

$$\text{RSD}_{15} = \frac{\text{Number of bass} \geq 15 \text{ inches}}{\text{Number of bass} \geq 8 \text{ inches}} \times 100$$

An  $\text{RSD}_{15}$  value between 10 and 40 indicates a balanced bass population, while values between 30 and 60 indicate a higher abundance of larger fish.  $\text{RSD}_{15}$  values of LMB in Bundick Lake have never been above 30 (range from 0 to 23; Figures 4 and 5). Since 2010, both spring and fall  $\text{RSD}_{15}$  values have been at or below 10%, indicating that in recent years, Bundick Lake has been out of balance with an overabundance of smaller fish. The fluctuations in both PSD and  $\text{RSD}_{15}$  values may be attributable to variable spawning success resulting in variable year class strength.

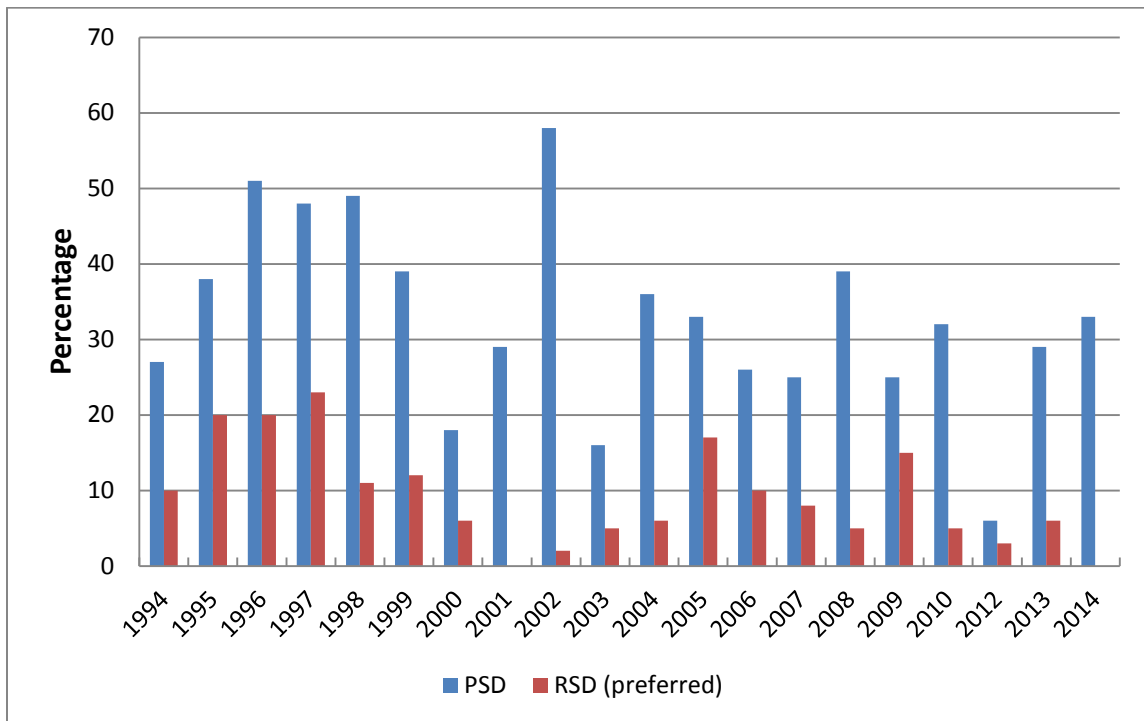


Figure 4. Proportional stock density and relative stock density (preferred) of largemouth bass collected during spring electrofishing on Bundick Lake, LA from 1994 – 2014.

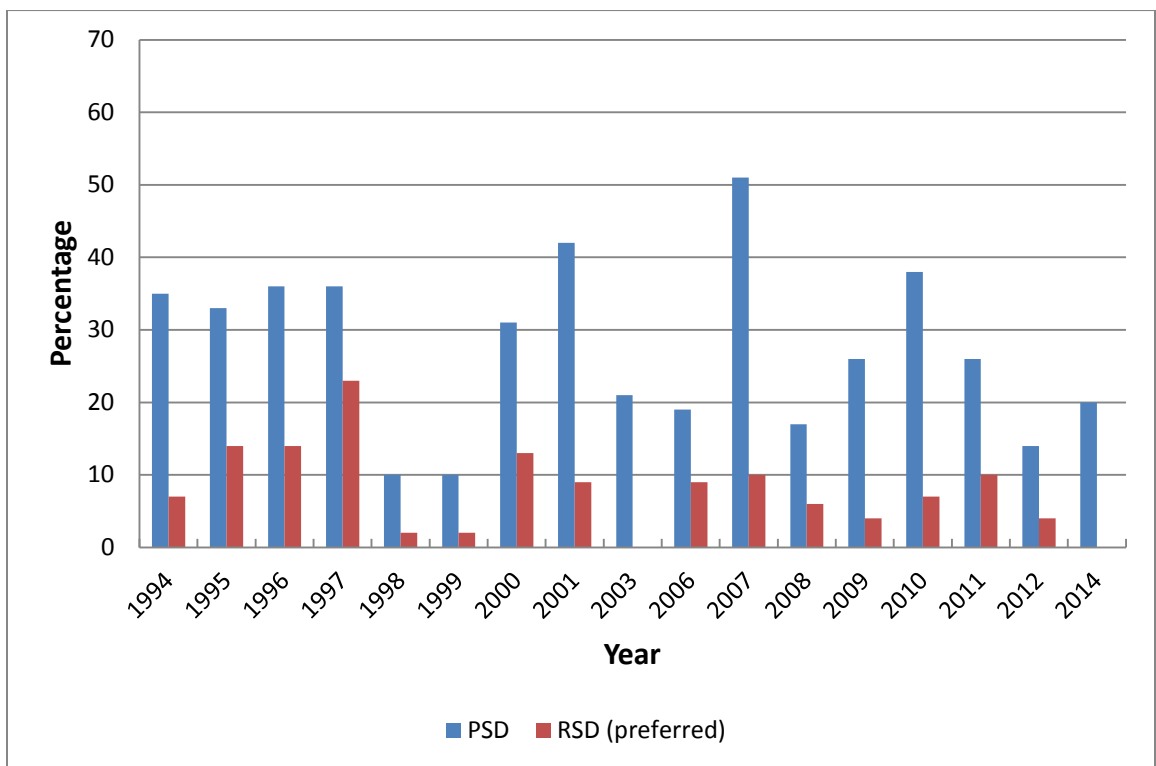


Figure 5. Proportional stock density and relative stock density (preferred) of largemouth bass collected during fall electrofishing on Bundick Lake, LA from 1994 – 2014.

### Age and growth

The LMB growth rates in Bundick Lake match average Louisiana statewide growth rates to age 1, then slightly exceed the state average for ages 2,3, and 5 (Figure 6). No age 4 fish have been collected in fall age and growth sampling on Bundick Lake. This missing age class and deviations from the statewide mean are probably the result of small sample size. A standardized age, growth, and mortality project will begin in 2015 and will require larger sample sizes and more accurately reflect growth rates in the lake.

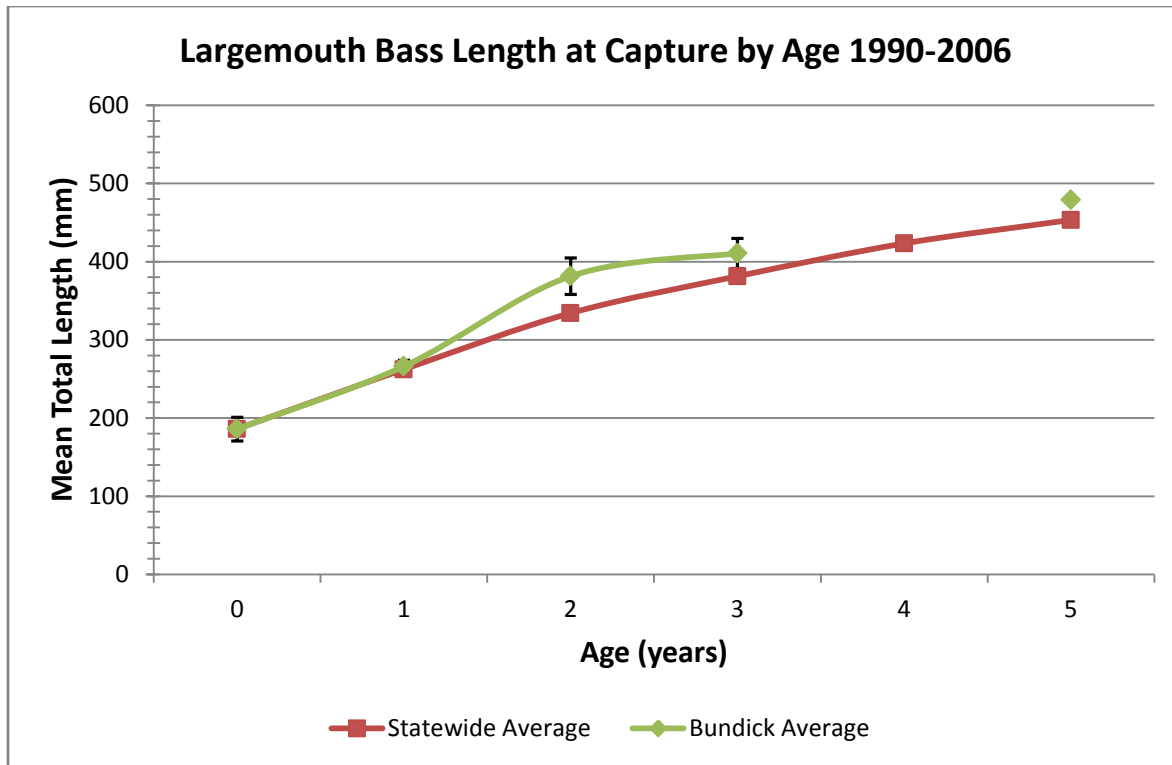


Figure 6. Largemouth bass mean length at capture by age ( $\pm$  95% CI) for fish collected during fall electrofishing from 1990-2006 (n = 82).

### Largemouth bass reproduction

In 2011, LDWF discontinued the use of seine samples to collect YOY relative abundance estimates. Examination of changes in sub-stock (<8" TL) relative abundance from spring to fall of a given year provide a relative indicator of recruitment success. In 2014, sub-stock CPUE increased from 0.8 bass/hour to 33.9 bass/hour, indicating good recruitment as a result of the 2013 drawdown (Figures 2 and 3).

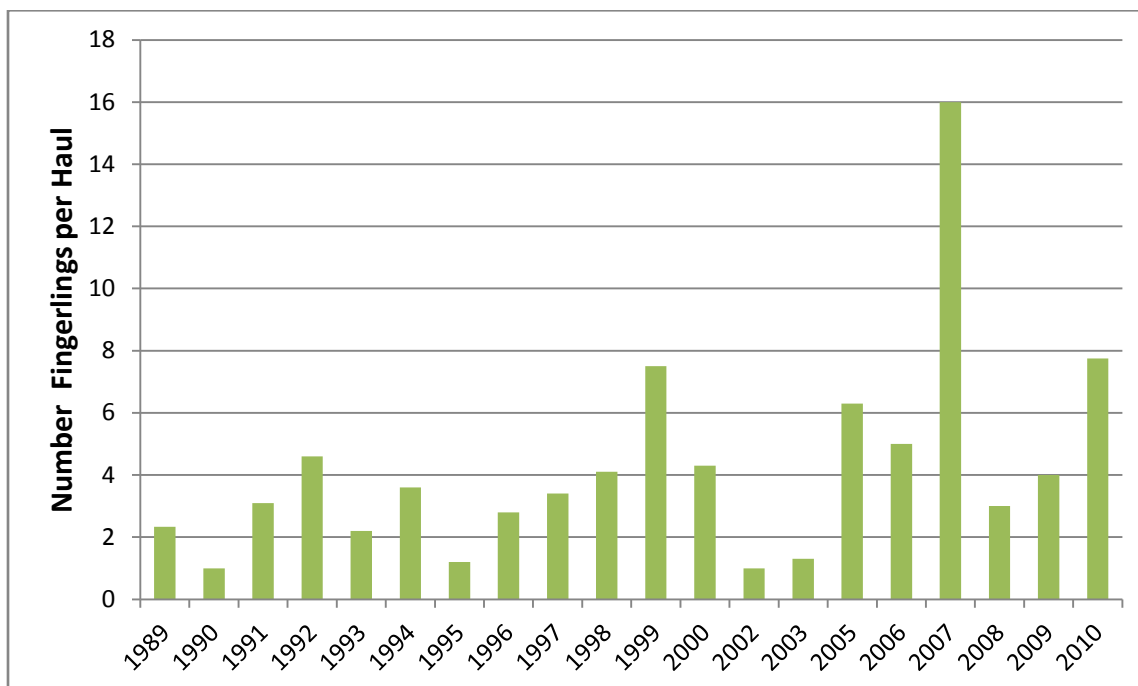


Figure 7. Number of largemouth bass fingerlings captured per seine haul from Bundick Lake, LA, for 1989-2010.

#### Largemouth bass genetics-

Genetic analyses through electrophoresis of liver tissues from largemouth bass show 10% or greater Florida influence from 2003-2009 (Table 1). This degree of gene introgression and persistence from relatively small FLMB stockings (122,375) from 2003-2009, indicates that Bundick Lake may be a good candidate to establish the Florida genome. An additional 15, 624 FLMB fingerlings and 25,100 phase II fingerlings were stocked in the spring and fall of 2014 as part of planned stockings for 2014 and 2015. Additional stockings are planned for 2016. The success of these stockings at introducing/maintaining the FLMB genome in Bundick Lake will be assessed during the standardized age, growth, and mortality project from 2015 to 2017.

Table 1. Genetic analysis of largemouth bass from Bundick Lake, LA for 1988-2009.

Year	Number	Northern	Florida	Hybrid	Florida Influence
1988	30	94.4%	0%	6.6%	6.6%
2003	31	81%	0%	19%	19%
2006	41	90%	0%	10%	10%
2008	50	88%	2%	10%	12%
2009	53	81%	0%	19%	19%

### Spotted bass

Spotted bass comprise 5% to 10% of the total samples of black bass collected in Bundick Lake. They are found most commonly in the lower reaches of the reservoir along the face of the dam, where the predominant habitat is gravel and rip-rap.

### Forage and Biomass

According to standardized electrofishing forage samples, the most commonly available forage for largemouth bass in Bundick Lake are *Lepomis* spp., primarily bluegill (*Lepomis macrochirus*) and longear (*L. microlophus*) sunfish (Figure 8). Both threadfin (*Dorosoma petenense*) and gizzard shad (*D. cepedianum*) are also important forage items whose relative abundance varies greatly. This variance may be a result of sampling bias more than actual abundance since LDWF forage sampling is not specifically designed to capture shad species. Other forage species include bullhead minnows (*Pimephales* spp.), freshwater silversides (*Labidesthes sicculus*), blacktail shiners (*Cyprinella venusta*), and golden shiners (*Notemigonus crysoleucas*).

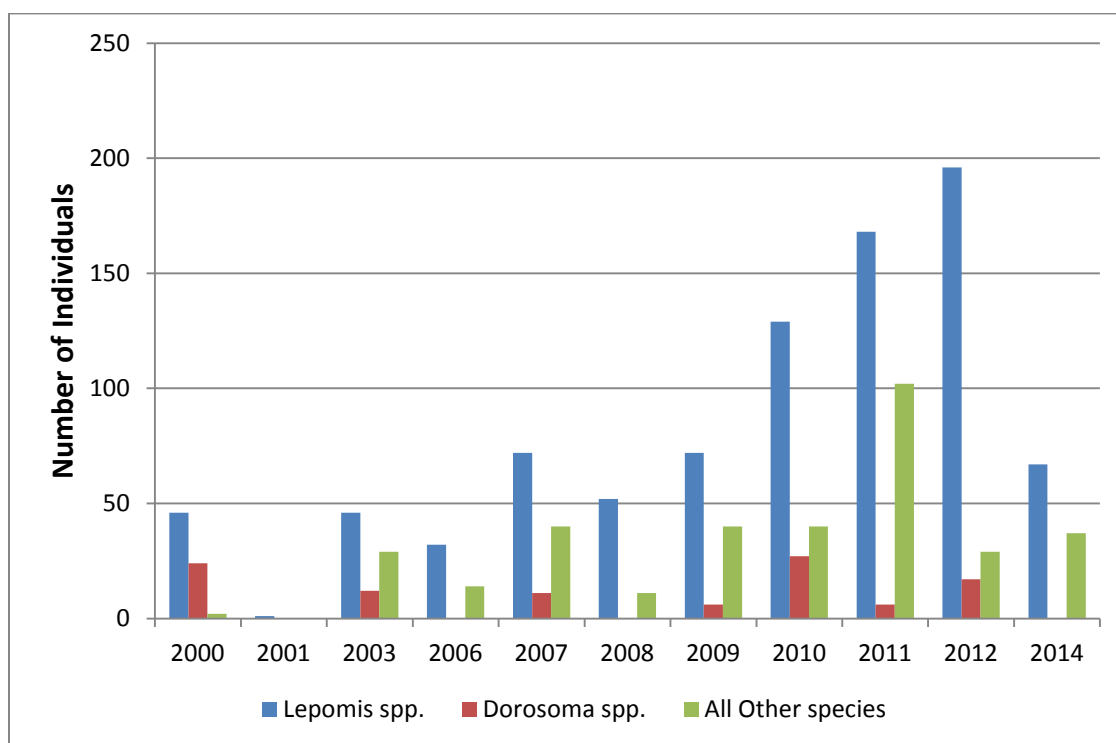


Figure 8. Number of *Lepomis* spp., *Dorosoma* spp., and all other species less than 6 inches TL captured in standardized fall forage samples on Bundick Lake, LA, from 2000-2014.

Mean total standing crop of fish in Bundick Lake from 1966 until 1993 was 189 lbs. /acre (Figure 9). Peak production for the total standing crop was in 1974 (375 lbs/acre) and 1980 (315 lbs/acre). Best overall game fish production was observed in 1979 (160 lbs. /acre). From 1981 to 1993 there was a downward trend in total standing crop which may be attributable to reduced productivity as physical characteristics of the impoundment changed over time.

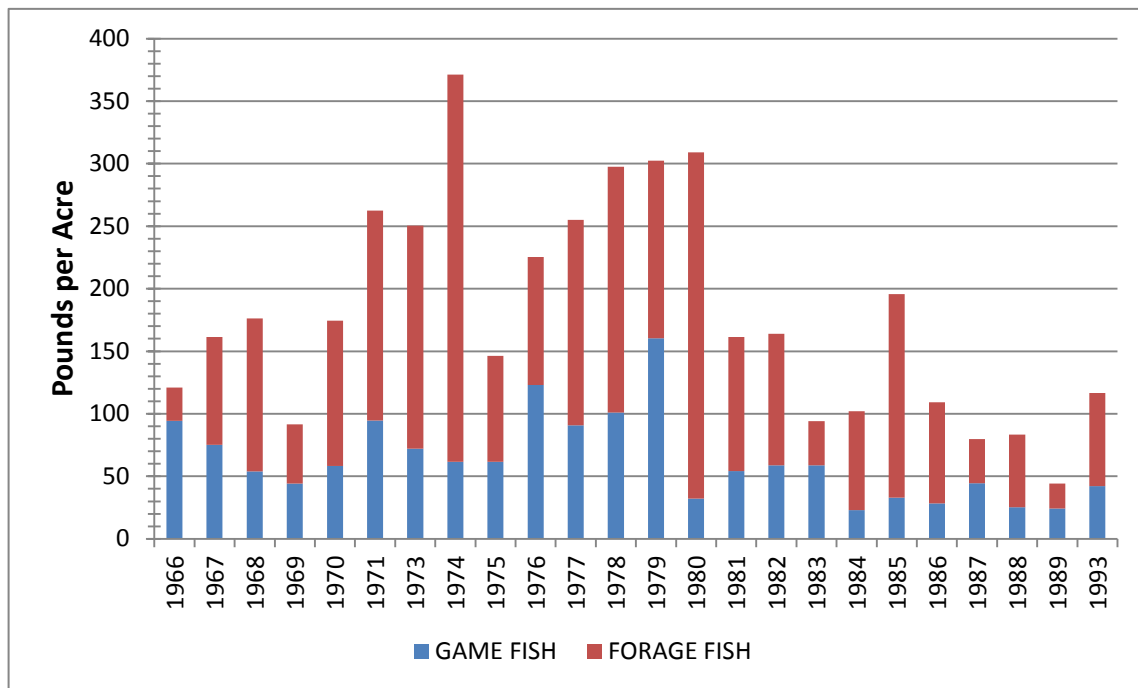


Figure 9. Standing crop estimates (biomass) in pounds per acre for game fish and forage species on Bundick Lake, LA, from 1966 to 1993.

### Crappie

Both white crappie and black crappie are collected in Bundick Lake. Standardized lead net samples from 2012 to 2014 consisted primarily of white crappie (96.7%), indicating they are the predominant crappie species in recent years. Due to the small sample size ( $n = 12$ ) over this time period, no black crappie specific data is presented here. There are two distinct peaks in the white crappie size distribution at 6" and 11" TL (Figure 10). This may be attributable to variable growth rates (Figure 11), a strong 2011 year class, harvest of 9"-10" fish by crappie anglers (Figure 12), or a combination of all three.

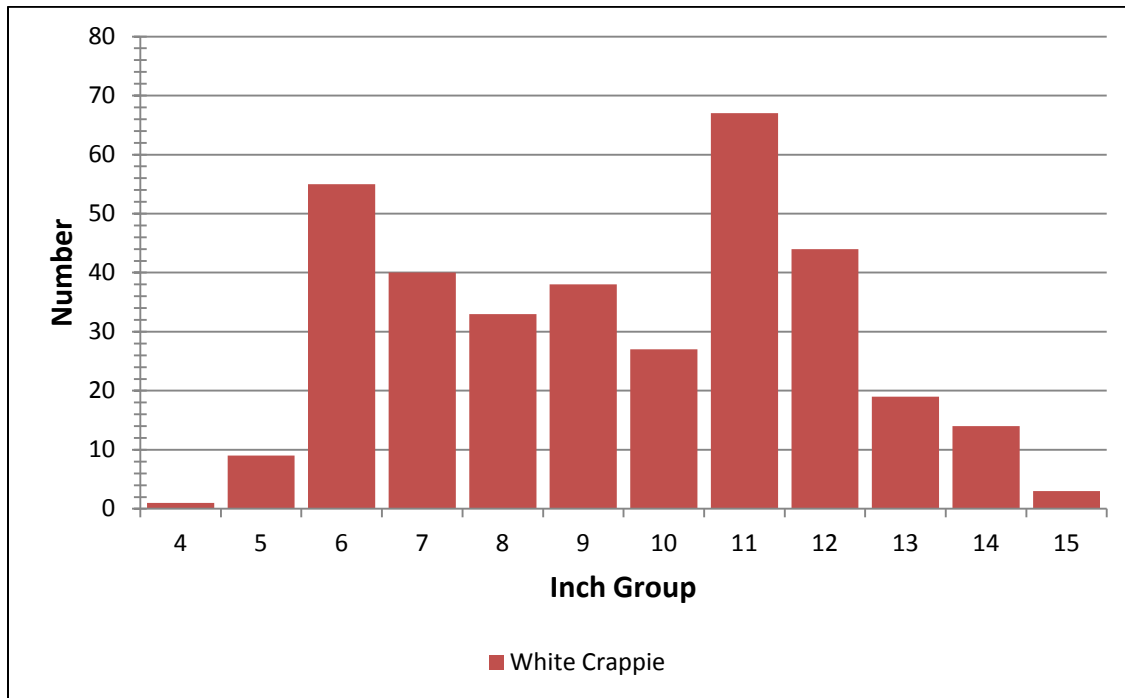


Figure 10. Size distribution (inch groups) of white crappie collected during standardized lead net sampling on Bundick Lake, LA from 2012-2014 ( $n=350$ ).

Crappie age and growth analysis indicated white crappie reached 10" TL in 2.1 years on average (Figure 11). Individual crappie in Bundick Lake show variable growth rates with 1.5 year old fish ranging in size from 6 to 10 inches. Growth rates slow dramatically by age 4. The majority of fish sampled for age and growth analysis were captured by lead nets. Age 0+ crappies are not represented due to size selectivity of the gear. Black crappie were not analyzed due to small sample size ( $n = 11$ ) in 2006. A standardized crappie population assessment was conducted from 2012 to 2014. Results of the study are projected to be available in 2015.

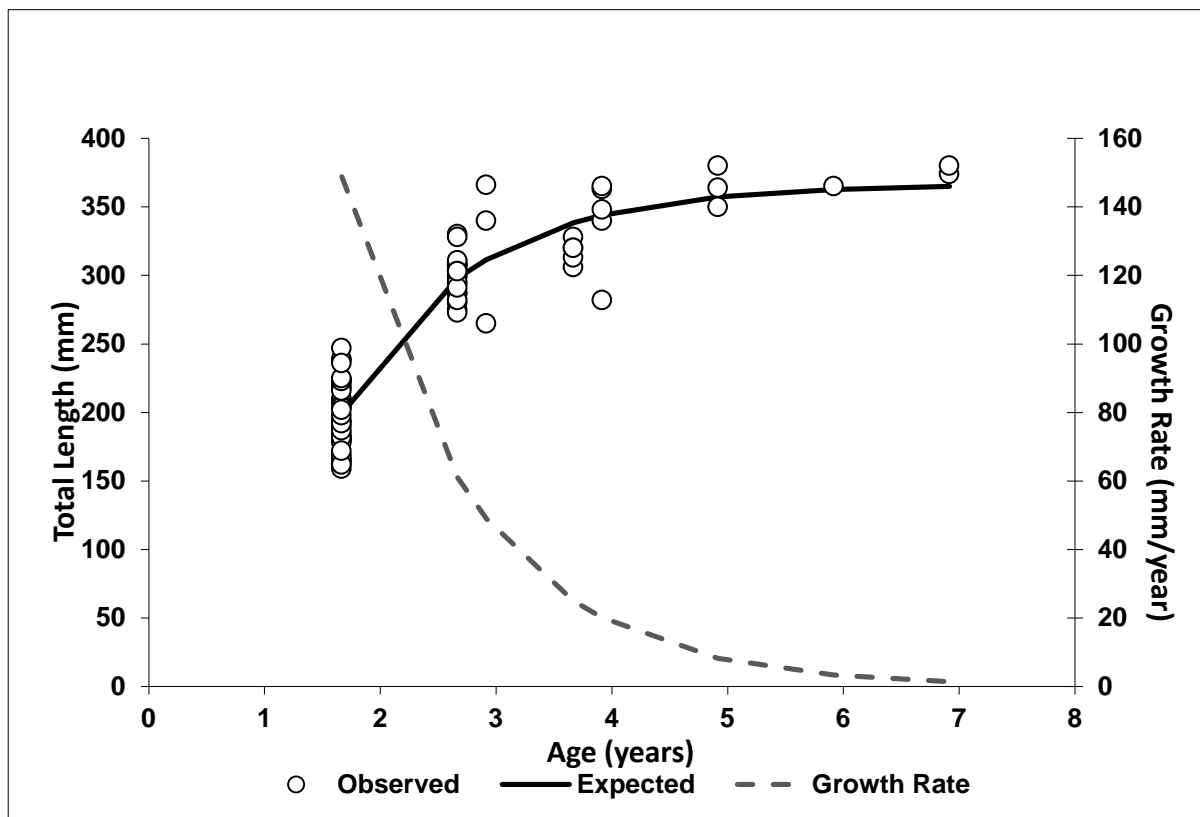


Figure 11. Von Bertalanffy growth model for white crappie collected in lead nets and gill nets from 2003 and 2006 (n = 79).

### Creel Surveys

Data collected during the 2002 creel survey indicated that fishing trips ranged from 3.0 to 4.5 hours in duration, with 5,344 anglers traveling 18 to 23 miles to fish the reservoir (Table 2). Largemouth bass anglers harvested 52.6% of their catch and most of the fish that were released (71.5%) were less than 12" TL (Table 3).

### *Largemouth bass anglers*

Total angler effort was 17,658 hours. Bass anglers expended the most effort (6,393 hours), followed by non-specific anglers (6,104 hours) and crappie anglers (4,512 hours). Eder, 1984 reports that angler effort of at least 30 hours/acre/year is required for significant impact to a given bass population. Even if total angler effort is applied to only 1,500 acres of Bundick Lake bass habitat (11.8 hours/acre), fishing pressure is insufficient for adjustments of the LMB population through the use of size regulations. When only bass angler effort is calculated, the ratio falls even lower (4.3 hours/acre). Bundick Lake angler effort, as measured in 2002 was insufficient to influence to the black bass population. Unless angler effort were to significantly increase, the application of size regulations as a management tool would have no benefit and would be inappropriate as a harvest regulation for black bass in Bundick Lake.

Table 2. Total number of anglers, mean number of anglers per boat, duration of fishing trip, and distance traveled from residence to boat ramp from 2002 creel survey on Bundick Lake, LA.

Target Species	Total Number of anglers	Mean Number of anglers in party	Mean length of fishing trip (hrs.)	Mean one-way distance traveled to ramp
Anything	2154	2.12	4.20	23
Largemouth Bass	1937	1.89	3.46	17
Crappie	1253	1.84	3.09	18

Table 3. 2002 creel data for largemouth bass caught per trip, released per trip, harvested per trip, and mean weight of harvested bass for non-specific and bass anglers on Bundick Lake, LA.

Target Species	Number LMB caught per trip	Number LMB released per trip	Number LMB harvested per trip	Average weight (lbs.) of harvested LMB
Anything	0.09	0.04	0.01	0.76
Largemouth Bass	1.69	0.57	1.12	1.18

Table 4. Total largemouth bass harvested, released, released below, and released above 12 inches by largemouth bass anglers in 2002 on Bundick Lake, LA.

Target Species	Total Number LMB harvested	Total Number LMB released	Number LMB released below 12"	Number LMB released above 12"
Largemouth Bass	2313	1186	848	376

### *Crappie anglers*

Bundick Lake 2002 creel data indicated peak crappie fishing occurred from November through February, with few anglers targeting crappie outside of this timeframe. The majority of crappie harvested (64.5%) were between 8" and 11" TL (Figure 10) and averaged 0.65 lbs. (Table 5). All creel estimates, charts, and figures are for black and white crappie species combined.

Table 5. Total crappie harvested, number harvested per trip, and average weight of crappie harvested by crappie anglers in 2002 on Bundick Lake, LA.

Target Species	Total Number Crappie harvested	Number Crappie harvested per trip	Average weight of harvested Crappie (lbs.)
Crappie	4214	2.48	0.65

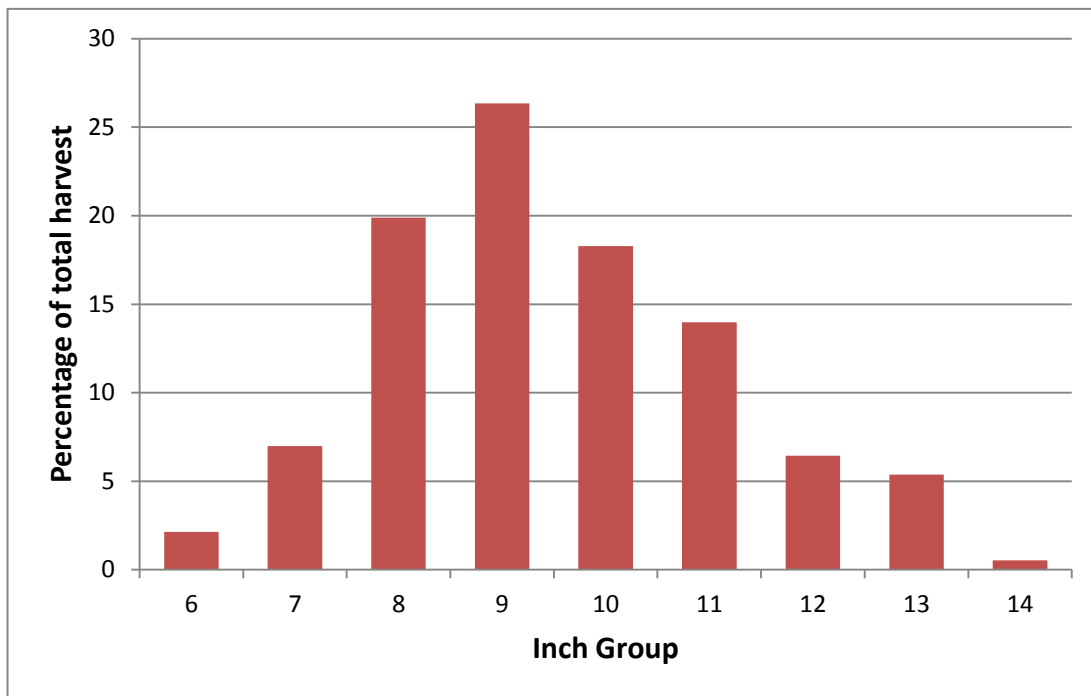


Figure 12. Size distribution (per inch group) of crappie harvested on Bundick Lake, LA during the 2002 creel survey (n=186).

### Commercial

Trotlines and slat traps are the only legal commercial gears allowed for use in Bundick Lake:

*Channel catfish* – 11 inch minimum length limit (10% may be undersized)

*Blue catfish* – 12 inch minimum length limit (5% may be undersized)

*Flathead catfish* – 14 inch minimum length limit (5% may be undersized)

### Species of Special Concern

N/A

## **HABITAT EVALUATION**

### *Fish Spawning Habitat*

Bundick Lake has a predominately sandy bottom with little accumulation of silts and organic materials. Because of this, nesting sport fish have abundant available spawning area. The abundance of inundated and fallen riparian timber also provides cavity nesters (catfishes) with sufficient areas for reproduction. Spawning habitat is not a limiting factor in Bundick Lake.

### *Juvenile fish habitat*

Submersed aquatic vegetation (SAV) abundance varies greatly from north to south in Bundick Lake. The northern third of the lake has abundant cover consisting of coontail (*Ceratophyllum demersum*), spatterdock (*Nuphar luteum*), and stonewort (*Nitella spp.*) as well as less beneficial vegetation such as alligator weed (*Alternanthera philoxeroides*), giant cutgrass (*Zizaniopsis*

*miliacea*), and common salvinia (*Salvinia minima*). The southern 2/3 of the lake has much less beneficial juvenile cover, however, pondweeds (*Potamogeton spp.*) and stonewort are found along the 2'-4' contour interspersed with coontail (2014 Vegetative Type Map, Part A). Spatterdock is found along many of the shorelines of the lake, and combined with the above mentioned SAV help to provide beneficial cover to juvenile centrarchids around much of the lake. With varying abundance, juvenile cover can sometimes be a limiting factor, and as of 2014, Bundick has over 10% coverage of beneficial aquatic plant species.

#### *Adult fish habitat*

Because Bundick is a relatively shallow lake, most of the lake is utilized by adult fish of all species. A thermocline is seldom present due to shallow water and wind action. Adult fish habitat is not a limiting factor. Approximately 86% (1,500 acres) is considered bass habitat.

#### *Water fertility*

Overall fertility has declined since inundation due to the natural aging process of the reservoir. This has been detrimental to overall fisheries production by reducing primary productivity, but beneficial in reducing overall abundance of nuisance aquatic vegetation, particularly water hyacinth. While the "new reservoir effect" is now gone, Bundick Lake remains a productive fishery with abundant fish populations of all species available for utilization by anglers.

#### *Problem vegetation*

Common salvinia is the predominant nuisance aquatic vegetation on the lake. Its abundance varies by season with coverage in some years reaching up to 70% of the lake surface. Alligator weed is also common and can block access to some areas of the lake. Peruvian water grass is a recent introduction (2006) that grows in thick mats and can choke out shallow coves. All of these plants negatively impact habitat and are detrimental to fisheries in the lake. Recent use of newer chemicals (imazapyr and imazamox), along with shallow water boats (Pro-Drives®) have enabled LDWF crews to access and reduce overall abundance of these nuisance species. In areas where problem plants had taken over and were the predominant species, we now see more beneficial plants such as spatterdock and coontail. Since the 2013 drawdown, giant cutgrass has been observed in significant amounts in multiple parts of the lake. While sporadic clusters may provide some benefit to fisheries, dense stands have formed in shallow parts of the lake and are affecting access.

#### Substrate

Bottom substrates of Bundick Lake consist primarily of hard packed river sand interspersed with clay banks and Asiatic clam shell accumulations.

#### Artificial Structure

Many of the artificial structures found in Bundick Lake consist of wharves, piers, and duck blinds. Often private property owners will place brush tops and Christmas trees adjacent to shorelines and piers as fish attractants. The LDWF District 5 crews in conjunction with the Bundick Lake Improvement Association placed seven tire reefs in 1992. Originally marked with buoys, the reefs provided several good years of fishing to recreational anglers before the buoys tore free and the exact locations were lost. LDWF was unable to locate these reefs during the 2013 drawdown.

## **CONDITION IMBALANCE / PROBLEM**

The northern end of Bundick Lake is susceptible to overgrowth of nuisance aquatic vegetation. Additionally, due to its large watershed and the natural life span of reservoirs, the lake has become shallower in this area over time. The northern end is particularly affected as sediments carried by the creek fall out of suspension with reduced water velocity.

## **CORRECTIVE ACTION NEEDED**

Control of invasive aquatic plant species is needed.  
Sedimentation must be minimized.

## **RECOMMENDATIONS**

- 1) Work with DEQ to identify sources of sediment runoff to improve water clarity in the lake.
- 2) Conduct treatments monthly using imazapyr (0.5 gal/acre) alternated with imazamox (0.5 gal/acre) with Turbulence (0.25 gal/acre) surfactant for control of alligator weed, Peruvian watergrass, and giant cutgrass. This treatment regime has provided excellent control of problem plants over the past several years and has led to us successfully reducing overall biomass of nuisance aquatic vegetation. If infestations consist primarily of common salvinia, a mixture of glyphosate (0.75 gal/acre) and diquat (0.25 gal/acre) with Aqua King Plus (0.25 gal/acre) and Air Cover (12 oz./acre) surfactants will be used from March 1 through October 31. Outside of that time frame, diquat (0.75 gal/acre) with a non-ionic surfactant (0.25 gal/acre) will be used.
- 3) Conduct standardized LMB assessment from 2015-2017.
- 4) Work with state and local agencies to replace the existing control structure with one of modern technology and materials which would provide easy operation and maintenance in order to execute planned management drawdowns.
- 5) Continue five year drawdown rotation schedule for shoreline maintenance with modified elevation range (5'-7' below pool). The next scheduled drawdown will be conducted in 2018. Work with parish government and LADOTD during these drawdowns to maintain/rebuild existing infrastructure (ramps, spillway, and piers) as needed.

## REFERENCES

- Eder S. 1984. Effectiveness of an imposed slot length limit of 12.0 to 14.9 inches on largemouth bass. *North American Journal of Fisheries Management* 4:469-478.
- Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. *Fisheries techniques*, 2<sup>nd</sup> edition. American Fisheries Society, Bethesda, Maryland.